

VISIT...

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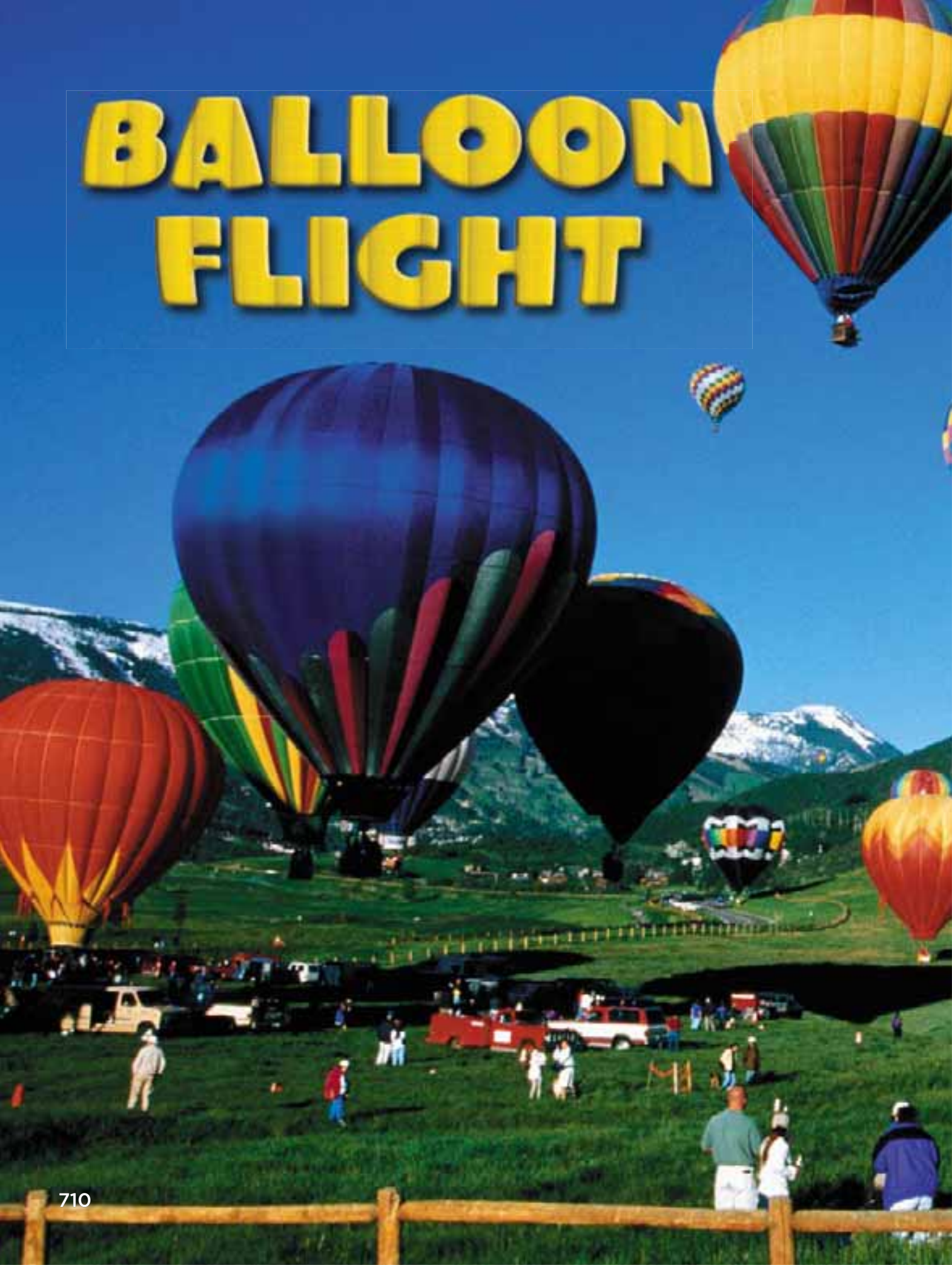
Writing Prompt

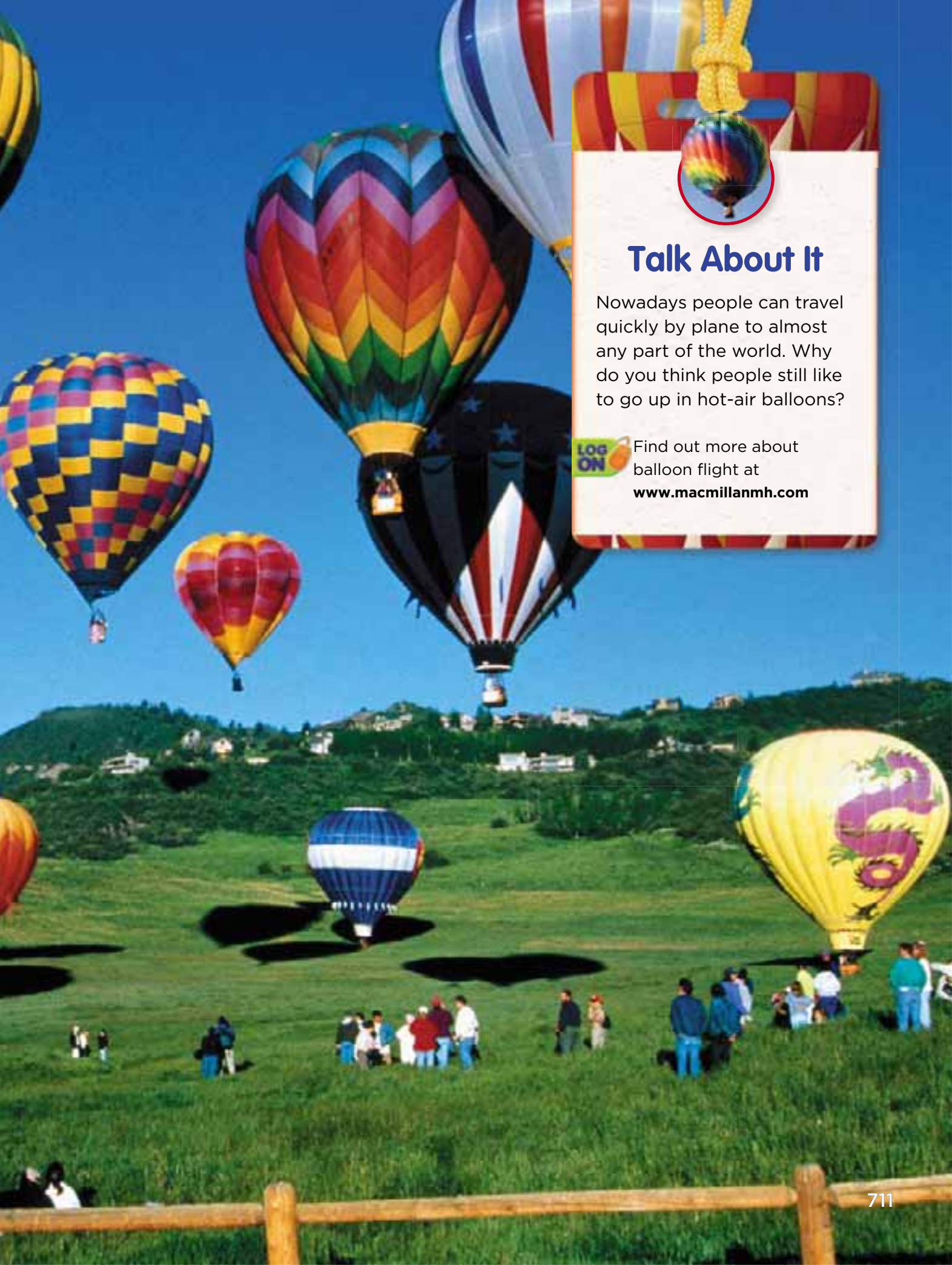
Your youth group has decided to take on a community service project, but you need community approval first. Write a persuasive editorial for your town's newspaper describing the project and making a strong argument for why it is a good project for the community.

Writer's Checklist

- ☒ Ask yourself, who is my audience?
- ☒ Think about your purpose for writing.
- ☒ Choose the correct form for your writing.
- ☒ Form an opinion about the topic.
- ☒ Use reasons to support your opinion.
- ☒ Be sure your ideas are logical and organized.
- ☒ Use your best spelling, grammar, and punctuation.

BALLOON FLIGHT





Talk About It

Nowadays people can travel quickly by plane to almost any part of the world. Why do you think people still like to go up in hot-air balloons?



Find out more about
balloon flight at
www.macmillanmh.com

Vocabulary

launched	anchored
particles	companion
dense	hydrogen
inflate	scientific



Word Parts

Greek Roots help you understand entire word families. The word *hydrogen* has the Greek root *hydr-*. This root means “water.” Most words beginning with *hydr-* have something to do with water.

The Science of Hot-Air Balloons

by Enriquez Mera

Since the first hot-air balloon was **launched** in 1783, few things have changed about how they fly. However, some new differences have made ballooning a safer activity enjoyed by many people worldwide.

In the past hot-air balloons were always made out of linen and paper. Today most are made of nylon. Long pieces of nylon, called *gores*, are stitched together to create the balloon. Balloonists use nylon because it is a thin and light material. Also, it cannot be damaged by heat.



Heat is the basic ingredient needed for ballooning. As air becomes hotter, tiny **particles** of matter move faster and faster. As the balloon fills with warmer particles, it begins to rise. This is because the air inside is lighter than the **dense** air surrounding the balloon. It is the warmer air particles that allow the balloon to float above the cooler air.

How the air is heated to **inflate** the hot-air balloon has changed a great deal since the early days of ballooning. Back in 1783 fire from damp straw and wool heated the air as the balloon remained **anchored** to the ground. Usually, a brave man or woman and a **companion** would climb into the basket, cut the line, and soar into the air.

Now balloonists use propane—the same gas used in most outdoor grills—instead of straw. For hot-air balloons, it is piped from a tank to metal

tubes. Once there, a small fire heats up the tubes and the propane. When the propane flame is released, it creates hot air that fills the inside of the hot-air balloon.

Besides propane, another gas that could be used is **hydrogen**. Hydrogen is a gas that has no odor, color, or taste and burns very easily. One advantage of hydrogen gas is that it does not need to be heated. However, hydrogen is expensive, so it is mostly used for balloons during **scientific** studies. These are studies designed to gather information that will help scientists.

Whether for science or sport, more people than ever are taking to the air in balloons.



Reread for Comprehension

Monitor Comprehension Make Generalizations

A Generalizations Chart helps you make broad statements that describe ideas or events. This will help you monitor your comprehension or understanding of what you read. To make generalizations, combine key facts from the text and your prior knowledge. Use your Generalizations Chart as you reread “The Science of Hot-Air Balloons.”

Fact	Opinion

Comprehension

Genre

Nonfiction gives information and facts about real people, places, events, and situations.

Monitor Comprehension

Make Generalizations

As you read, combine information from the text with prior knowledge. Use your Generalizations Chart.

Fact	Opinion

Read to Find Out

How has the invention of ballooning been useful?

Up in the Air:

The Story of Balloon Flight

by Patricia Lauber

Award
Winning
Author





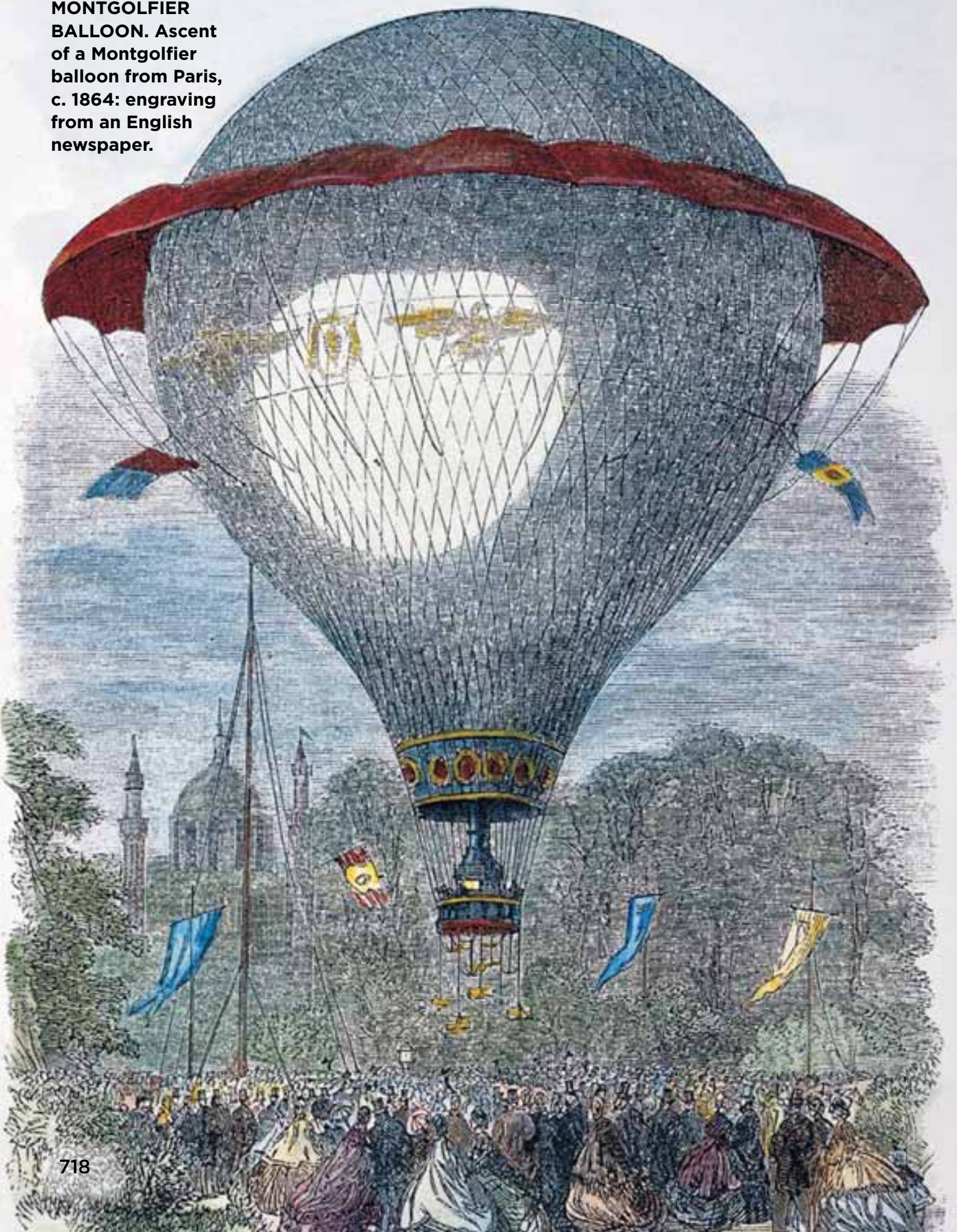
Saturday promises to be fair, with no high winds, no storms. It's a perfect day for ballooning. Members of the balloonist club turn out early and set to work. Fans blow air into the balloons. Tongues of orange flame shoot out of roaring gas burners, heating air to make the balloons rise. The balloons **inflate** and stand up. Pilots climb into their baskets, the ground crews let go of the ropes, and it's up, up, and away.

A balloon floats along, silent as a cloud, until a pilot turns on the burners to heat air inside and gain altitude. Balloons cannot be steered. They travel only where the winds carry them. By changing altitude, though, a pilot may find a different wind, going in a different direction. A chase crew follows on land to bring balloonists and balloons home at journey's end.

Today thousands of people in many parts of the world belong to balloon clubs. Their sport was invented more than 200 years ago by a handful of people who willingly risked their lives flying the balloons they had built.

As the balloons fill with hot air, they stand upright. They are ready to soar away, carrying pilots and passengers in big baskets called gondolas.

**MONTGOLFIER
BALLOON.** Ascent
of a Montgolfier
balloon from Paris,
c. 1864: engraving
from an English
newspaper.



The Story of Ballooning

People have always dreamed of soaring like a bird or floating like a cloud. Over several hundred years a few people thought they knew how to do this. They theorized that a certain kind of big balloon might lift them up. The balloon would be lighter than the air around it, and it would float in air as a boat floats in water. But no one managed to make such a balloon until 1783 when two French brothers built and **launched** the world's first hot-air balloon. Their names were Joseph and Etienne Montgolfier.

The World's First Balloon Flight

Hot smoky air rising from a fire had given Joseph Montgolfier an idea. Perhaps such air would make a balloon rise. Using small balloons Joseph found that it did.

After many experiments the brothers built a balloon that was about 30 feet across and 38 feet tall. It had a wooden frame at the base and was made of linen backed with paper. On June 5, 1783, near the city of Lyons, France, the Montgolfiers built a huge fire of damp straw and wool. Hot air poured into the base of the balloon. As a small crowd watched in amazement, the balloon stirred, swelled, and finally rose upright.

Eight men were holding the balloon down. At a signal they let go. It rose some 6,000 feet into the air and stayed aloft for ten minutes, landing gently in a nearby vineyard. This was the world's first public balloon flight.

The Montgolfiers mistakenly thought smoke, not hot air, made a balloon rise. They used damp fuel to create dense smoke which escaped in flight.



Professor Charles' hydrogen balloon came to a bad end when attacked by pitchforks and dragged through the mud.



A Lighter-than-Air Balloon

Meanwhile in Paris, Professor Jacques A. C. Charles had designed a lighter-than-air balloon. He filled his balloon with a newly discovered gas called **hydrogen**, which weighed much less than air.

On August 27, 1783, Professor Charles launched his balloon at 5 P.M. As a crowd watched, it rose 3,000 feet and disappeared into the clouds.

Forty-five minutes later the balloon came down outside a village 15 miles away. The villagers, who had never heard of such a thing as a balloon, thought a monster had fallen out of the sky. As it bounced toward them, they attacked it with pitchforks. When at last the monster lay still, men tied it to a horse's tail and dragged it through the mud to make sure it was dead.

Now there were two ways to send balloons aloft: with hot air and with hydrogen. The fires were messy and dangerous, but hydrogen took a lot of time to make. Nevertheless, most of the early flights were made with hot-air balloons.

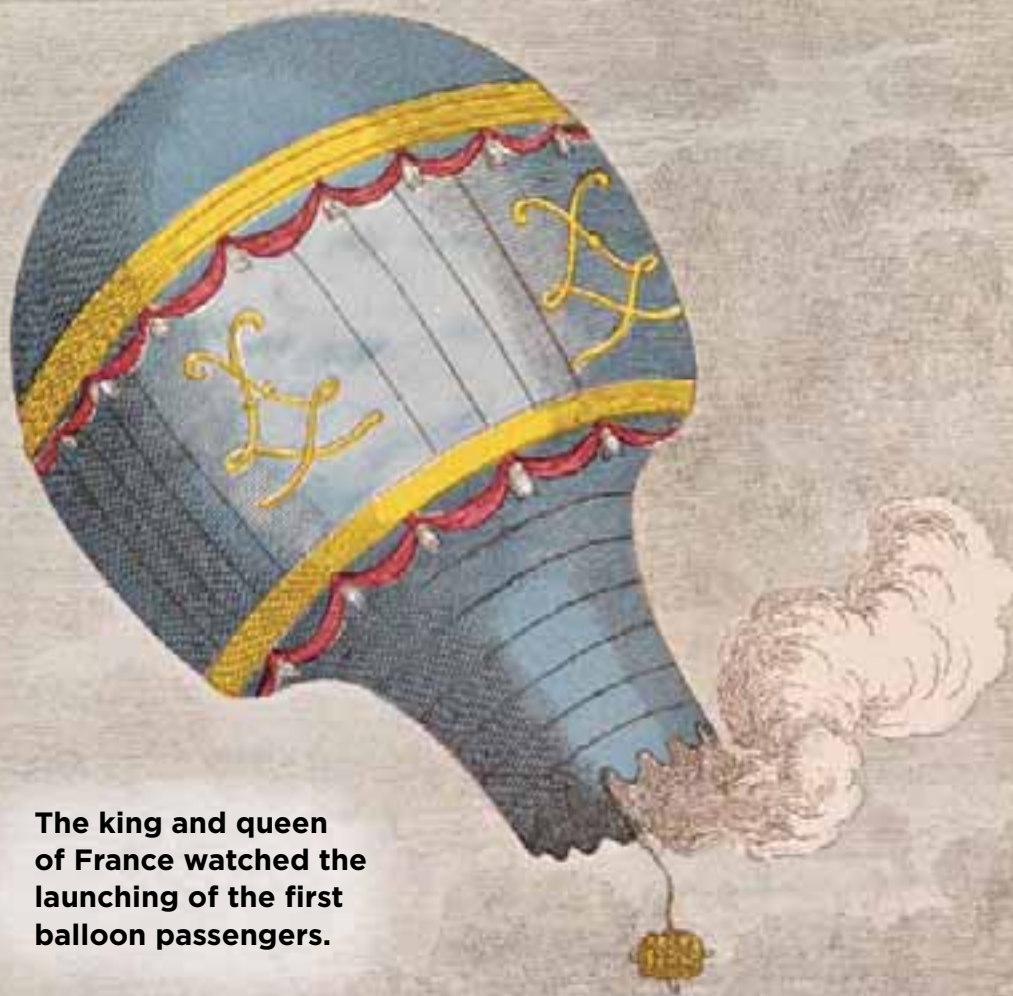


**Professor Jacques
A. C. Charles**



Make Generalizations

What generalization does the author make about early balloon flights?



**The king and queen
of France watched the
launching of the first
balloon passengers.**

The First Passenger Balloons

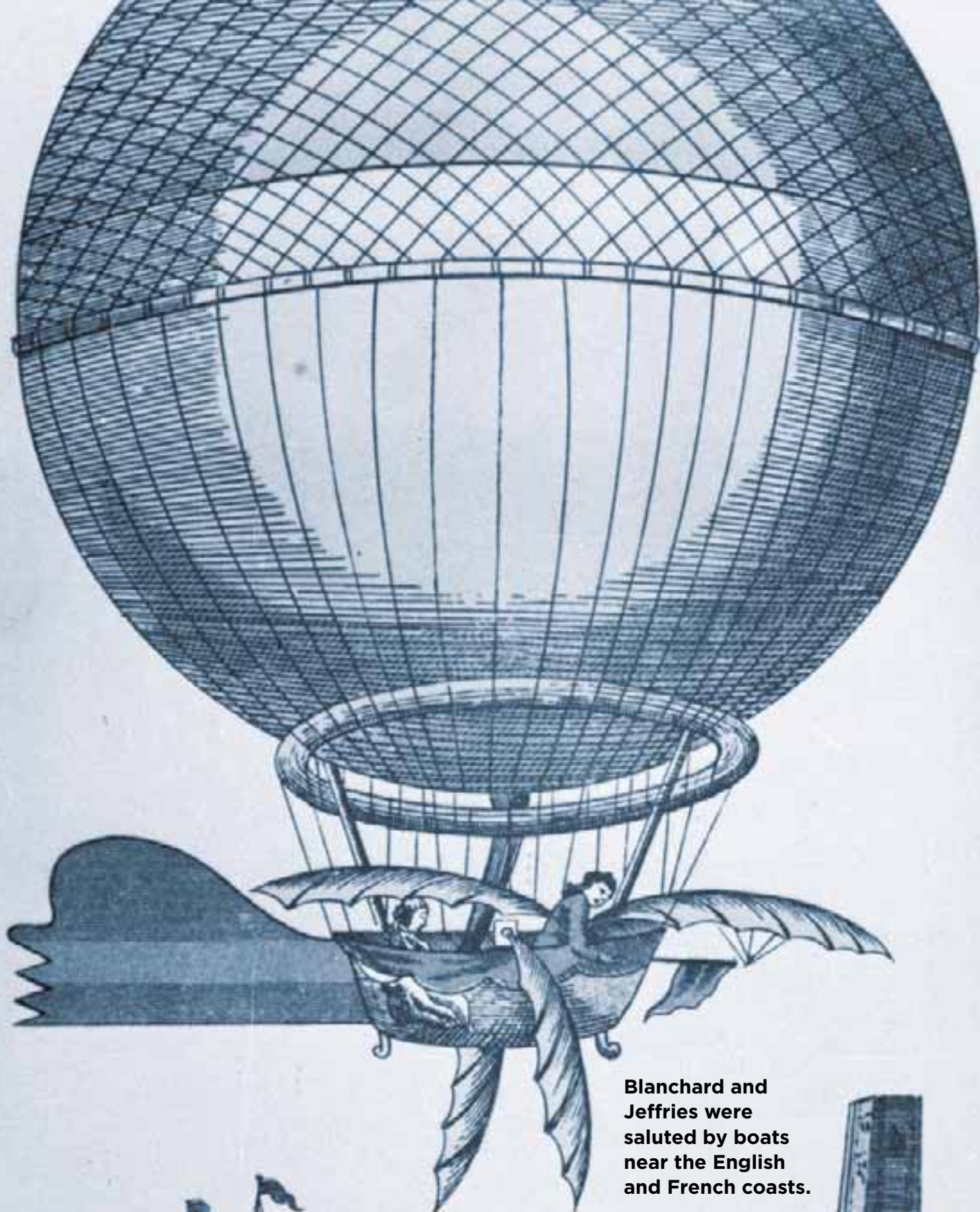
The first passengers to go up in a balloon were a trio of animals—a duck, a rooster, and a lamb. On September 19, 1783, they traveled in a wicker basket, or gondola, attached to a balloon. After a short flight, the air in the balloon cooled and the passengers drifted safely to Earth. Their flight showed that it was possible to breathe while floating a few thousand feet above Earth.

It was now time for humans to risk ballooning. A daring young French chemist was the first. On October 15, 1783, François Pilâtre de Rozier went up 100 feet. He was **anchored** to the ground by a long rope called a tether. His balloon carried a big metal pan under its mouth. A fire in the pan sent hot air into the balloon. The flight was a success. After that de Rozier made many tethered flights to find out how much straw and wool he needed to burn for each hour he stayed in the air.

By November 21, de Rozier was ready to make the first untethered flight. A huge crowd gathered to watch. The giant balloon filled, and at 1:54 P.M., de Rozier and a **companion** were up, up, and away. When the balloon was 200 feet in the air, the pair took off their hats and bowed to those below. Then they sailed off over Paris. The travelers flew for 25 minutes and covered about five miles before landing in a field outside the city.

Spectators watch de Rozier and his companion as they take flight in a hot-air balloon.





**Blanchard and
Jeffries were
saluted by boats
near the English
and French coasts.**

Daring Balloonists

Between 1783 and 1785, many men, and some women, went up in balloons. Some went for sport. Others, more daring, wanted to do what no one had done before. Jean-Pierre Blanchard was one of these. Blanchard wanted to cross the English Channel from England to France.

On January 7, 1785, the wind was blowing in the right direction over the cliffs of Dover. Blanchard and his American friend John Jefferies filled their balloon with hydrogen, climbed in, and set off for France.

The first half of the trip went smoothly, but then the balloon began leaking gas. The water came closer and closer. To lighten the load, they threw everything overboard—their bags of sand, food and drink, anchors. They were still sinking. Finally they stripped and threw their clothes overboard, saving only their cork life jackets.

The weather changed. The air grew warmer, heating the gas. The balloon rose, and they sailed over the French coast, landing in a forest where they were soon rescued.

On January 9, 1793, Blanchard made the first flight in North America, taking off from Philadelphia and carrying out **scientific** experiments at 5,000 feet. He brought back sealed bottles of air that showed there was less oxygen at that height than at sea level. He also measured his heartbeat and found it was faster. At sea level it beat 84 times a minute; at 5,000 feet it beat 92.

In the years ahead, daring balloonists would keep setting records, but the chief discoveries were made in 1783, when a handful of people who dreamed of flying up, up, and away, made the dream come true.



On June 4, 1784, Marie Thible, an opera singer, became the first woman to make a balloon flight. She sang an aria while floating over Lyons, France.



Make Generalizations

The author makes a generalization that all the chief discoveries in balloon flight were made in 1783. Do you agree? Why or why not?

A balloonist uses a gas heater to warm the air.



Why a Balloon Rises and Floats

When you place a block of wood in water, it takes up space, pushing some of the water aside. As the wood pushes against the water, the water pushes back. This upward force is called *buoyancy*. Buoyancy is the force that keeps things afloat.

A hot-air balloon rises and floats in an ocean of air for the same reason that the block of wood floats in water. It has buoyancy.

Like all matter, air is made of tiny **particles** called molecules. When air is heated, its molecules spread out and move faster. When the air inside a balloon is heated, some of the molecules inside the balloon are forced out. The air inside becomes thinner, or less **dense**. It weighs less than before, but it takes up the same amount of space. As a result, the air inside the balloon weighs less than an equal amount of outside air. Buoyancy carries the balloon up.

Some gases are lighter than air because the molecules themselves are less dense. One of these is hydrogen, the lightest gas known. However, it is a dangerous gas that can burn and explode. That is why balloonists today use helium, which is slightly heavier but does not burn or explode. Helium is the gas used in party balloons.

The Science Behind Hot-Air Balloons



Air is made of tiny particles called molecules.



When air inside a balloon is heated, some of the molecules are forced out.



Air inside weighs less than air outside, so the balloon is carried up by buoyancy.

Balloons Then and Now

In the centuries since 1783, balloons have found many uses in both war and peace. Many balloonists have competed to soar the highest or to make the longest voyage. Here are a few important events.

1860s:

In the Civil War, Union troops, like the French Army before them, used balloons to spy behind enemy lines to see how battles were going.



1900s: The early 1900s brought the dirigible, or blimp. Made of several balloons, it was fitted with motors and propellers that let the pilot steer. A cabin on the underside held more than 100 people on Atlantic crossings.

1875: Three French scientists, exploring the atmosphere, soared to 25,000 feet in a balloon. The men took bottles of oxygen with them, but when the balloon landed only one scientist had survived.



1932:

The man who invented a way to travel safely high into the atmosphere was a Swiss named Auguste Piccard, who built a ball-shaped aluminum gondola. Sealed inside with oxygen tanks, he safely reached a height of 54,000 feet.





1961: Brave men kept going higher and higher. Two U.S. Navy officers, Malcolm D. Ross and Victor Prather, Jr., went up 113,740 feet in an open gondola to test space suits for astronauts.



Present day: Planes have long been the way to travel by air, but you often see a dirigible carrying a TV crew above a football game or other sports event.

1999: Others had crossed the oceans, but Bertrand Piccard (grandson of Auguste) and Brian Jones were the first to balloon non-stop around the world, covering 30,000 miles in 20 days. Their balloon was a cross between a hot-air balloon and a gas balloon.



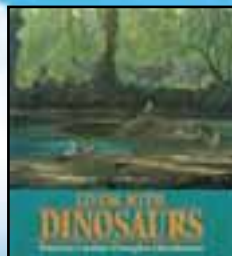
Every day: Hundreds of small weather balloons explore the atmosphere and transmit their findings to Earth.



Up, Up, and Away with Patricia Lauber

Patricia Lauber says she was probably born wanting to write but had to wait until she had gone to school to learn a few things. She has been writing happily ever since and has produced about 125 books. Many are about things in the natural world, such as volcanoes, dinosaurs, and planets. Patricia loves doing the research for these books because she is always learning something new. Filled with enthusiasm about a new subject, she shares what she has learned by writing books. Patricia Lauber lives in Connecticut with her husband and their two cats, Beemer and Meetoo.

Another book by Patricia Lauber:
Living with Dinosaurs



Find out more about
Patricia Lauber at
www.macmillanmh.com

Author's Purpose

This nonfiction piece informs and explains.
Identify text features that convey information.





Comprehension Check



Summarize

Making generalizations will help you organize information and summarize it more effectively. Use your Generalizations Chart to help you summarize *Up in the Air*.

Fact	Opinion

Think and Compare



1. Describe a few characteristics of a modern-day balloon ride. What clues in the article help you make these generalizations?

Monitor Comprehension: Make Generalizations

2. Reread page 723. Why do you think the first balloon passengers were animals? Include facts from the selection in your answer. **Analyze**
3. Hot-air balloons transformed life over 200 years ago. Think about a recent **scientific** invention that has affected you. Identify the invention and tell how it has changed your life. **Evaluate**
4. People risked their lives to fly in hot-air balloons. How has their commitment to science contributed to the modern world? **Explain**
5. Reread “The Science of Hot-Air Balloons” on pages 712–713. Compare and contrast the different ways hot-air balloons are able to fly. Use details from each selection in your answer. **Reading/Writing Across Texts**





Poetry

Haiku is an unrhymed form of Japanese poetry that is three lines long. The first line has five syllables; the second line, seven syllables; the third line, five syllables.



Literary Elements

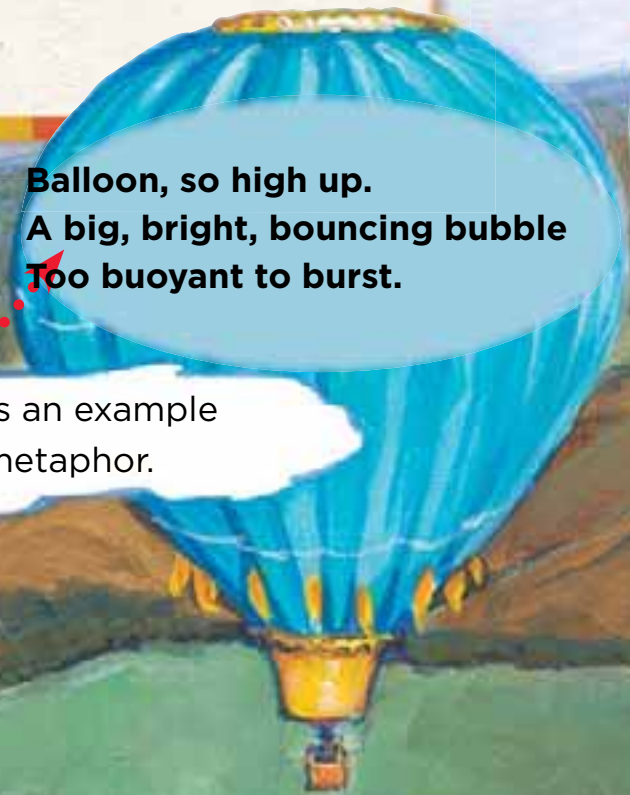
A **Simile** is a comparison of two essentially unlike things that uses the words *like* or *as*.

A **Metaphor** is a comparison of two essentially unlike things that does *not* use the words *like* or *as*.



Hot-Air Balloon Haiku

by Rita Bristol



**Balloon, so high up.
A big, bright, bouncing bubble
Too buoyant to burst.**

This is an example
of a metaphor.



**What a strange flower!
With petals as white as sheets.
A bee sleeps within.**

What do clouds feel like
Floating above the balloon
As it takes you far?

It floats like freedom
In the hazy August light
Soon, though, it will land.

This is an example
of a simile.

Connect and Compare

1. Find another example of metaphor in one of the other haiku. **Metaphor**
2. How do these four haiku help readers get a stronger sense of seeing or being in a hot-air balloon? **Analyze**
3. What is the difference between the information in these haiku and the information presented in “Up in the Air”?

Reading/Writing Across Texts



Find out more about haiku at www.macmillanmh.com

Writer's Craft

Rearrange Ideas

Writers have to know how something works to explain it clearly. They use everyday examples and sometimes need to **rearrange ideas** to explain complicated concepts more clearly. As you revise, you may want to move a sentence or paragraph.

I carefully arranged the ideas in my explanation about how helium-filled balloons float.

I used an example from everyday life.



Write to Explain How Something Works

How a Helium Balloon Floats

by Tamara E.

Have you ever wondered why the balloons we blow up with air from our lungs don't float up in the air? Balloons filled with helium from a tank float easily. Why is this? Think about what it means to float in a swimming pool. A 2-liter bottle filled with sand will sink to the bottom. However, that same bottle filled with air will float.

The same thing happens with the balloons you blow up yourself. The air inside the balloon is not lighter than the air outside, so it sinks. Helium gas actually weighs less than air, so helium balloons float up to the sky.

Your Turn

Write a short essay telling how something works. You might explain something you already know about. Or, you might decide to do research to find out how something works. As you write your explanation, remember that it has to make sense to anyone who will read it. Rearrange ideas if necessary. Use the writer's checklist to check your writing.



Writer's Checklist

- ☒ **Ideas and Content:** Did I select a topic that I can explain to others?
- ☒ **Organization:** Did I **rearrange ideas** so that they fit together well?
- ☒ **Voice:** Did I make my explanation clear by using examples from everyday life?
- ☒ **Word Choice:** Did I use common words instead of complex, scientific terms?
- ☒ **Sentence Fluency:** Did I use prepositions to help my sentences and paragraphs flow well?
- ☒ **Conventions:** Did I use commas correctly after introductory words? Did I proofread my spelling?